

never been reopened since they were first closed by the materials introduced into them by the river, and that all the contained fossils belong to one and the same geological period. He points to the discovery of species not before found in Pleistocene beds as only a repetition of what has occurred in other sections he has worked, and remarks also that the increase of species is corroborative of a suggestion of Mr. C. Reid that the more we discover of the smaller creatures of this and the preceding age, the more they approximate to those of our own times. Even if we were to exclude from the lists all the species not previously found fossil elsewhere, we still have an extensive assemblage of the older Pleistocene forms, which must have lived during the filling of the fissures, and this therefore fixes the filling operation as having occurred in Pleistocene times.

2. 'The Vertebrate Fauna collected by Mr. Lewis Abbott from the Fissure near Ightham, Kent.' By E. T. Newton, Esq., F.R.S., F.G.S.

The vertebrate remains collected by Mr. Lewis Abbott are passed in review, and as far as possible specifically identified: they represent mammals, birds, reptiles, and amphibians; but no fishes have been found. In all, 48 different forms have been recognized; 3 or perhaps 4 are extinct; 11 are extinct in Britain, but are still living elsewhere; 21 are living in Britain, but are known to be Pleistocene or Forest-bed forms; and 12 are species now living in Britain which have not hitherto been recognized in Pleistocene or older deposits.

Among the more important species found in this fissure, but extinct in Britain, may be noticed, besides *Elephas primigenius*, *Rhinoceros antiquitatis*, and *Hyæna*, the *Ursus arctos*, *Canis lagopus*, *Myodes torquatus*, *Myodes lemmus*, *Microtus gregalis*, *M. ratticeps*, *Lagomys pusillus*, *Spermophilus*, and *Cervus tarandus*. The name of *Mustela robusta* is proposed for some limb-bones intermediate between the Polecat and Marten, and the remains of an extremely small Weasel are noticed as a variety of *Mustela vulgaris*. Although the large number of living species gives a recent aspect to this series of remains, the evidence, it is believed, points rather to their being all of Pleistocene age, and most nearly allied to the fauna of British caves.

MISCELLANEOUS.

On the Embryology of the Cumacea.

By P. BUTSCHINSKY, of the University of Odessa.

THE segmentation of the ova in *Iphinoë maotica*, Sowin., is of the centro-lecithal type. All the segmentation-nuclei, which in the centre of the ovum are surrounded by radiating aggregations of

protoplasm. travel towards the surface, and a uniform blastoderm is finally constituted*.

The rudiment of the future germinal streak now becomes recognizable on the ventral surface of the ovum in the shape of a thickening of the blastoderm, and three separate thickenings may be remarked in the extent of this rudiment; these are the paired anterior optic lobes and an unpaired posterior thickening, which gives rise by the process of multiplication to a large number of cells (meso-endoderm). This internal mass of cells becomes further differentiated into three rudiments:—(1) The yolk-cells, which migrate into the yolk, (2) the endoderm- and (3) the mesoderm-cells.

The proctodæum is formed earlier than the rudiment of the stomodæum and has the appearance of a very long tube. Both of these structures originate as invaginations of the ectoderm. The mid-gut is built up from the cell-material of the endoderm. As the cells of the endoderm multiply they arrange themselves so as to form an epithelium. The liver develops very early on the ventral surface of the endodermal furrow, and forms in the anterior portion of the latter two lateral tubes, which are composed of large cells. These rudiments are paired and present the appearance of folds, which are open upon the dorsal side; their edges grow together, and two hepatic sacs are formed from them, each of which becomes divided into two secondary hepatic sacs in consequence of a longitudinal invagination.

The entire central nervous system originates as a thickening of the ectoderm at the period of the formation of the anterior appendages. In the early stages it takes the shape of paired ectodermal thickenings; these gradually coalesce and give rise to an unpaired cord, from which the 18–19 ganglia are subsequently formed.

The unpaired eye develops from two separate thickenings of the hypodermis of the foremost optic lobes, and undergoes a complicated metamorphosis.

The earliest rudiment of the heart takes the shape of a compact collection of mesoderm-cells on the dorsal side, in which the cavity subsequently appears.

The genital organs also develop at the same time; these appear as a paired mesodermal rudiment situated above the intestinal canal.

The dorsal organ arises very early on the dorsal side as an oval aggregation of ectoderm-cells; it persists for a long time, and disappears after all the organs of the animal are formed.

A complete memoir of mine upon the embryology of the Cumacea, accompanied by three plates, will be published in the 'Mémoires de la Société des Naturalistes de la Nouvelle-Russie à Odessa.'—*Zoologischer Anzeiger*, xvi. Jahrg., no. 430, October 2, 1893, pp. 386, 387.

* I observed this in *Parapodopsis cornuta* and *Gebia littoralis*.